MONDAY, JULY 3

what is geography to a machine?, coordinate reference systems, projections, geopandas, spatial joins, choropleths, plotting geography

STEP ONE

OPEN UP YOUR BEACH BALL
AND BLOW IT UP

STEP TWO

DRAW A LARGE STAR ON YOUR BEACH BALL

STEP TWO.5

MARK TWO POINTS ON YOUR BALL WITH ① AND ②

STEP THREE

MARK THE DISTANCE BETWEEN THE POINTS ON PAPER

STEP FOUR

CREATE TWO COORDINATES TO REPRESENT ①, AND TWO COORDINATES TO REPRESENT ②

LIKE, I DUNNO, THINK ABOUT LATITUDE/LONGITUDE IF YOU WANT

STEP FIVE

GIVE YOUR FRIEND GROUP THE COORDINATES: CAN THEY LOCATE THE RIGHT LOCATIONS?

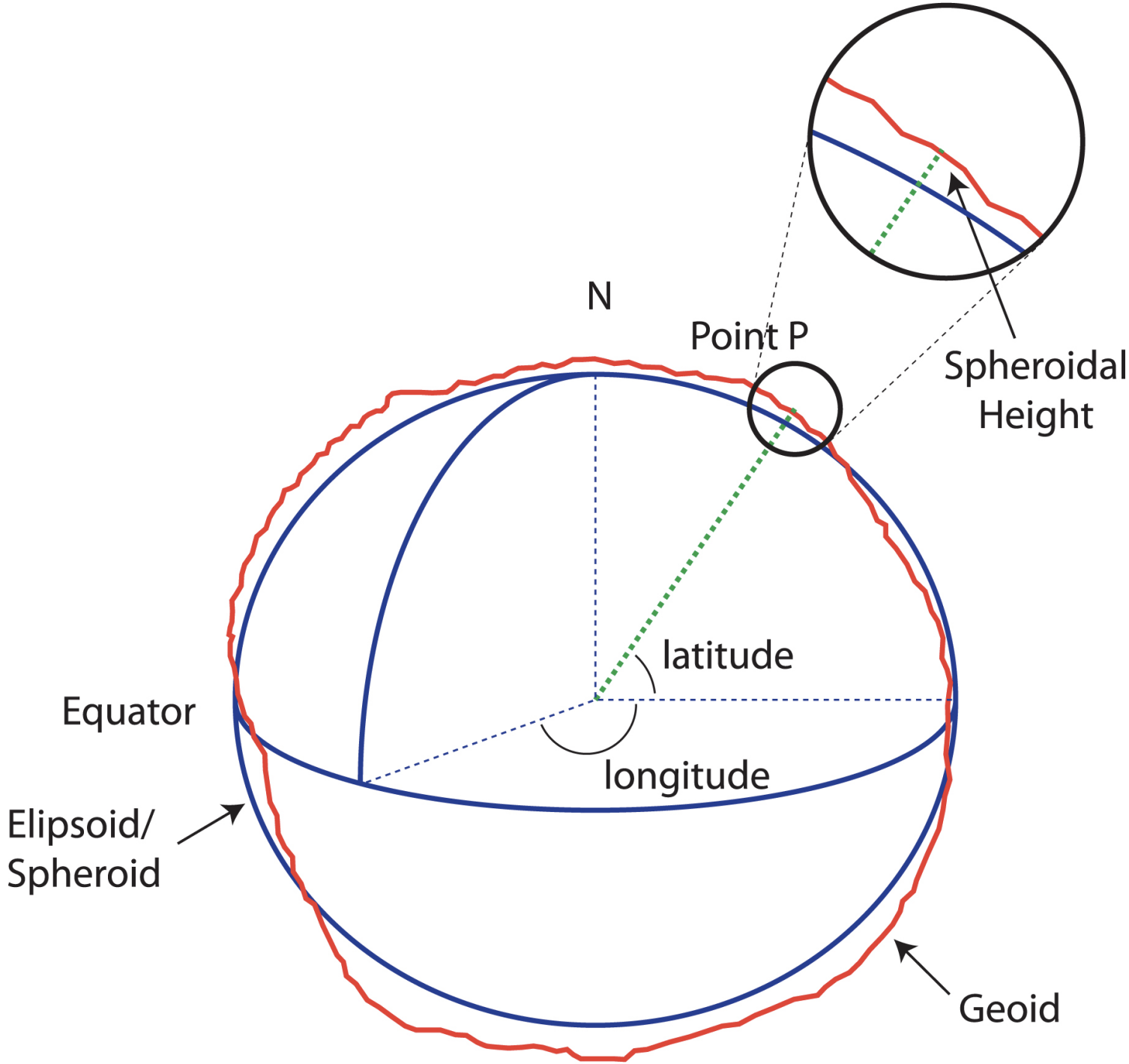
STEP SIX

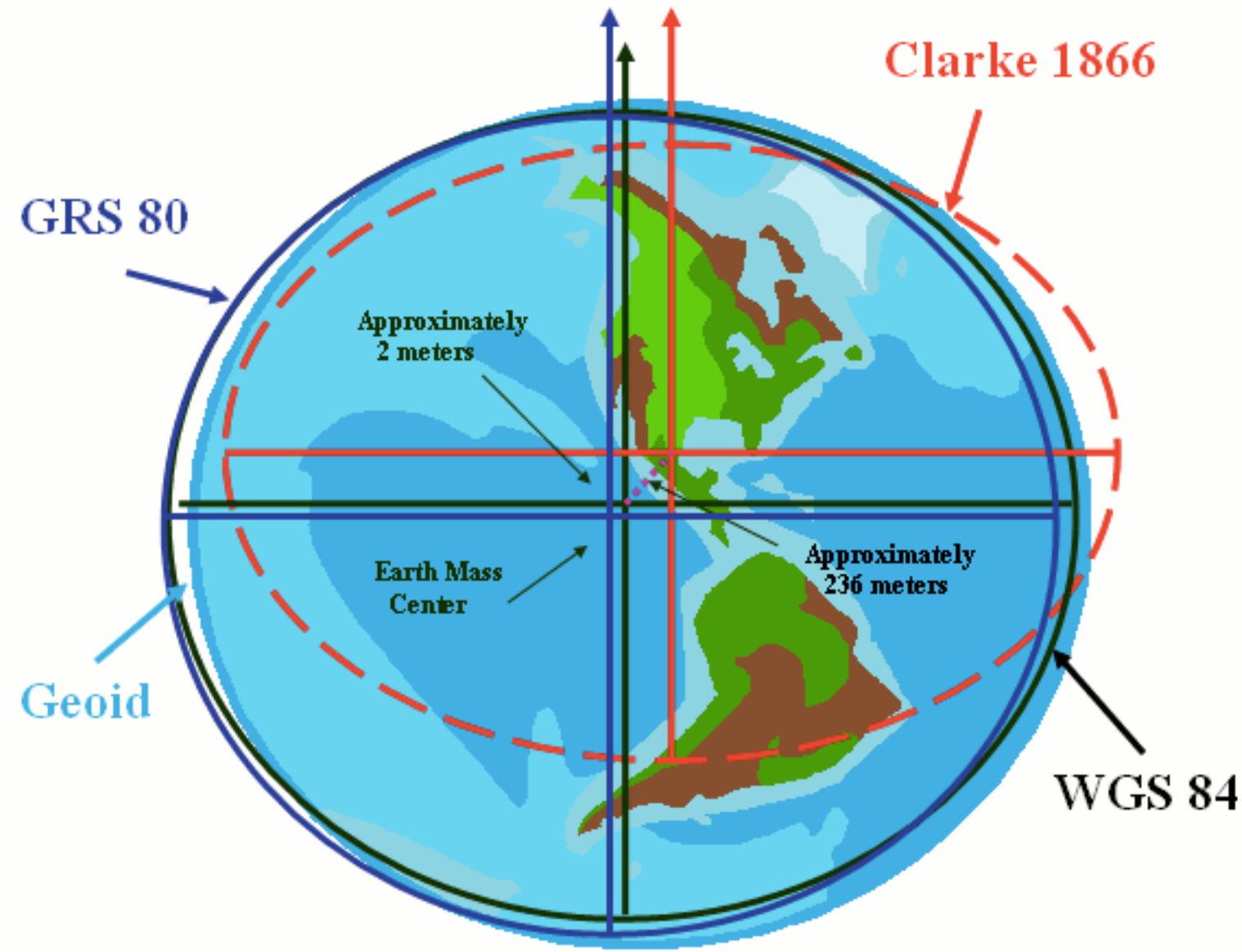
HOLD THE BEACH BALLS NEXT TO EACH OTHER. ARE THEY THE SAME SIZE AND SHAPE?

YOUR SHAPE IS DIFFERENT THAN THE OTHER GROUP'S

THIS IS THE **SPHEREOID** AND THE **DATUM**

WHAT'S THE SHAPE OF THE EARTH?


N
Point P
Spheroidal
Height
latitude
Equator
longitude
Elipsoid/
Spheroid
Geoid


Clarke 1866
GRS 80
Approximately
2 meters
Earth Mass
Center
Approximately
236 meters
Geoid
WGS 84

EVERY MEASUREMENT OF THE EARTH MAKES **ASSUMPTIONS**.

...AND THEY'RE **WRONG**, BUT IT'S **IMPOSSIBLE TO DO RIGHT.**

STEP SEVEN

CUT APART AND/OR STRETCH YOUR BEACH BALL TO MAKE IT AS FLAT AS POSSIBLE

THIS IS A **PROJECTION**

😞 PAPER IS FLAT BUT GLOBES AREN'T 😞

PROJECTION DISTORTIONS

Area: how big is something?

Form: what is something's shape?

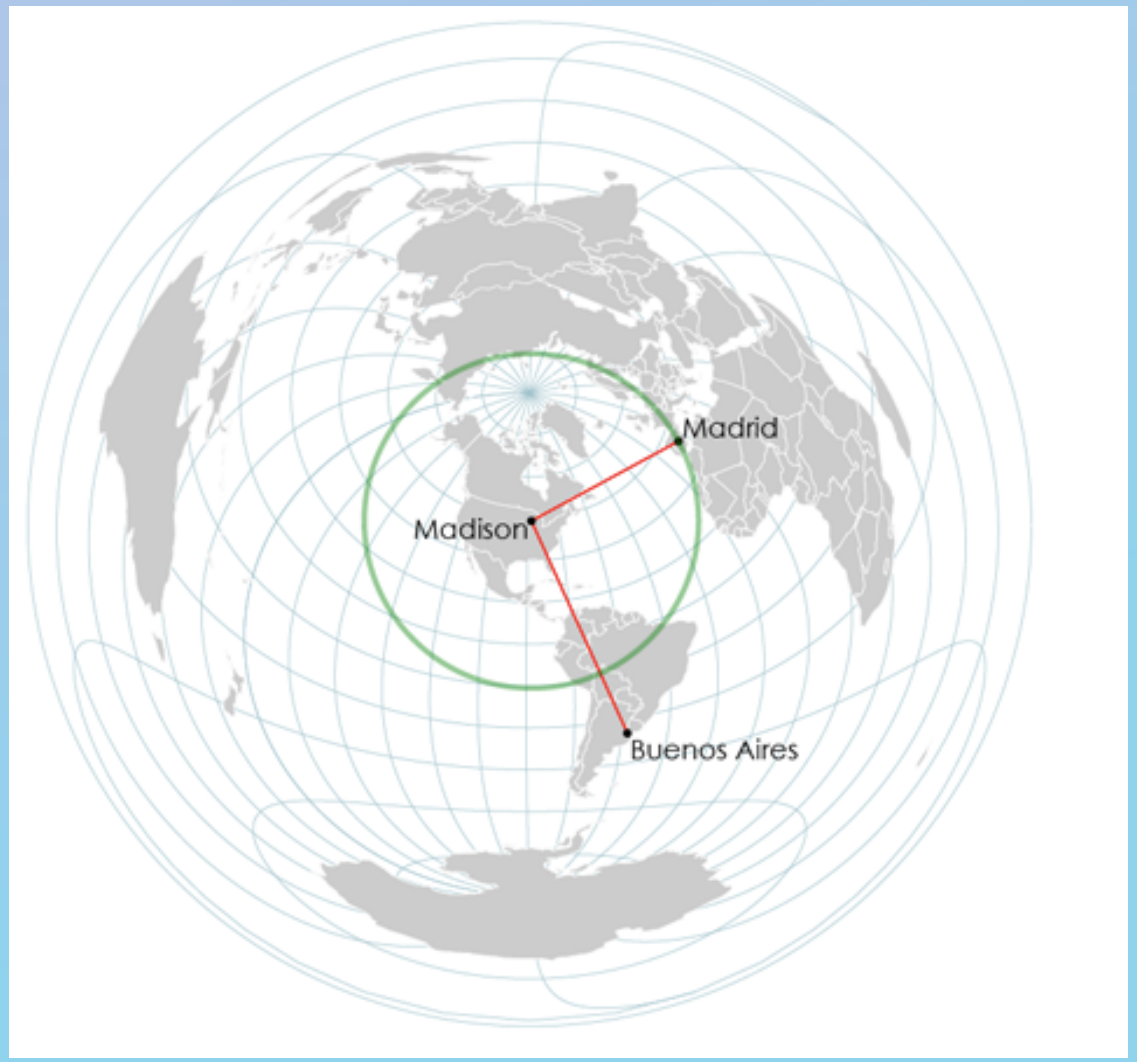
Distance: how far apart are 2 things?

Direction: shortest path between points?

AREA

FORM

DISTANCE



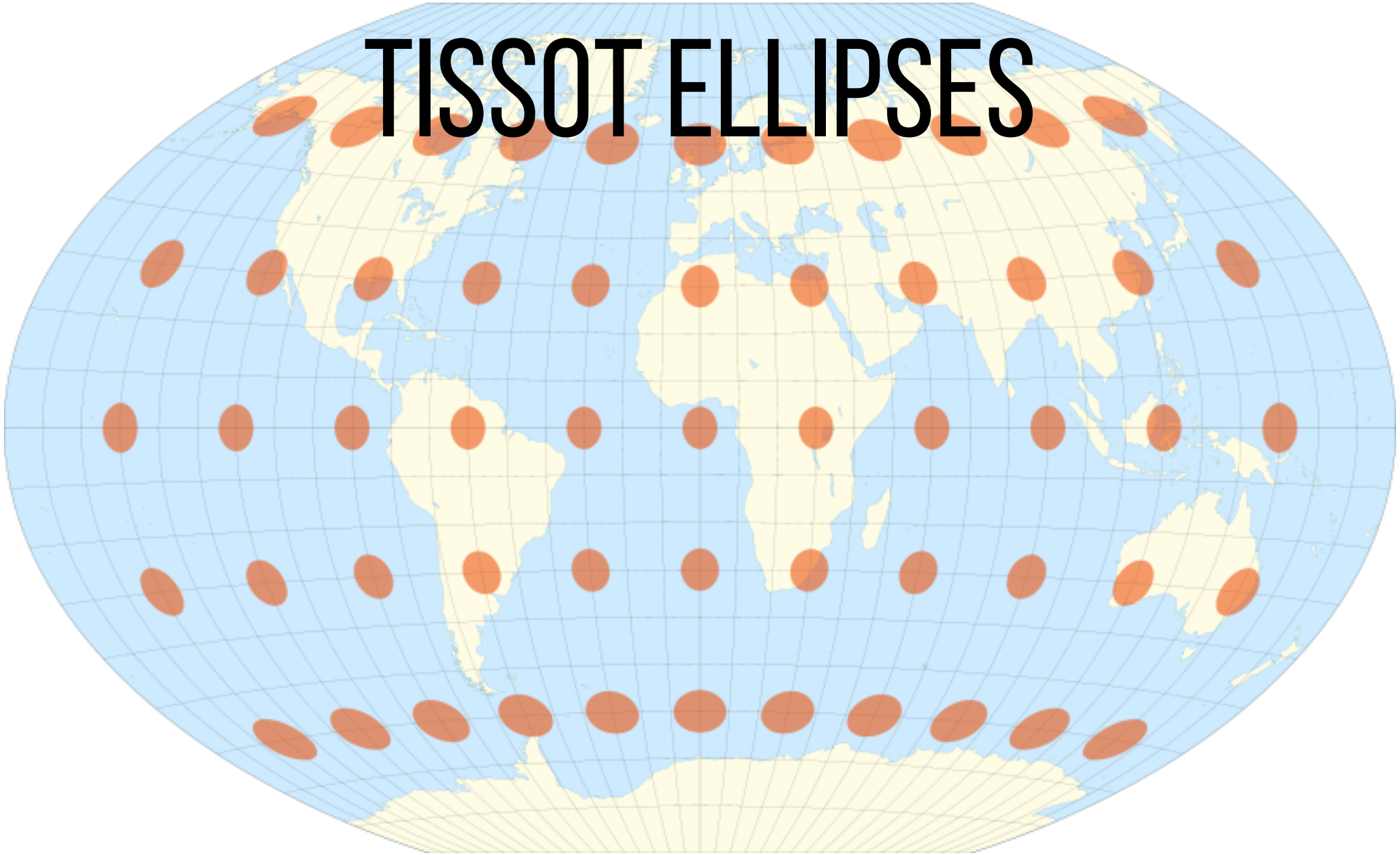
DIRECTIONS

TISSOT ELLIPSES

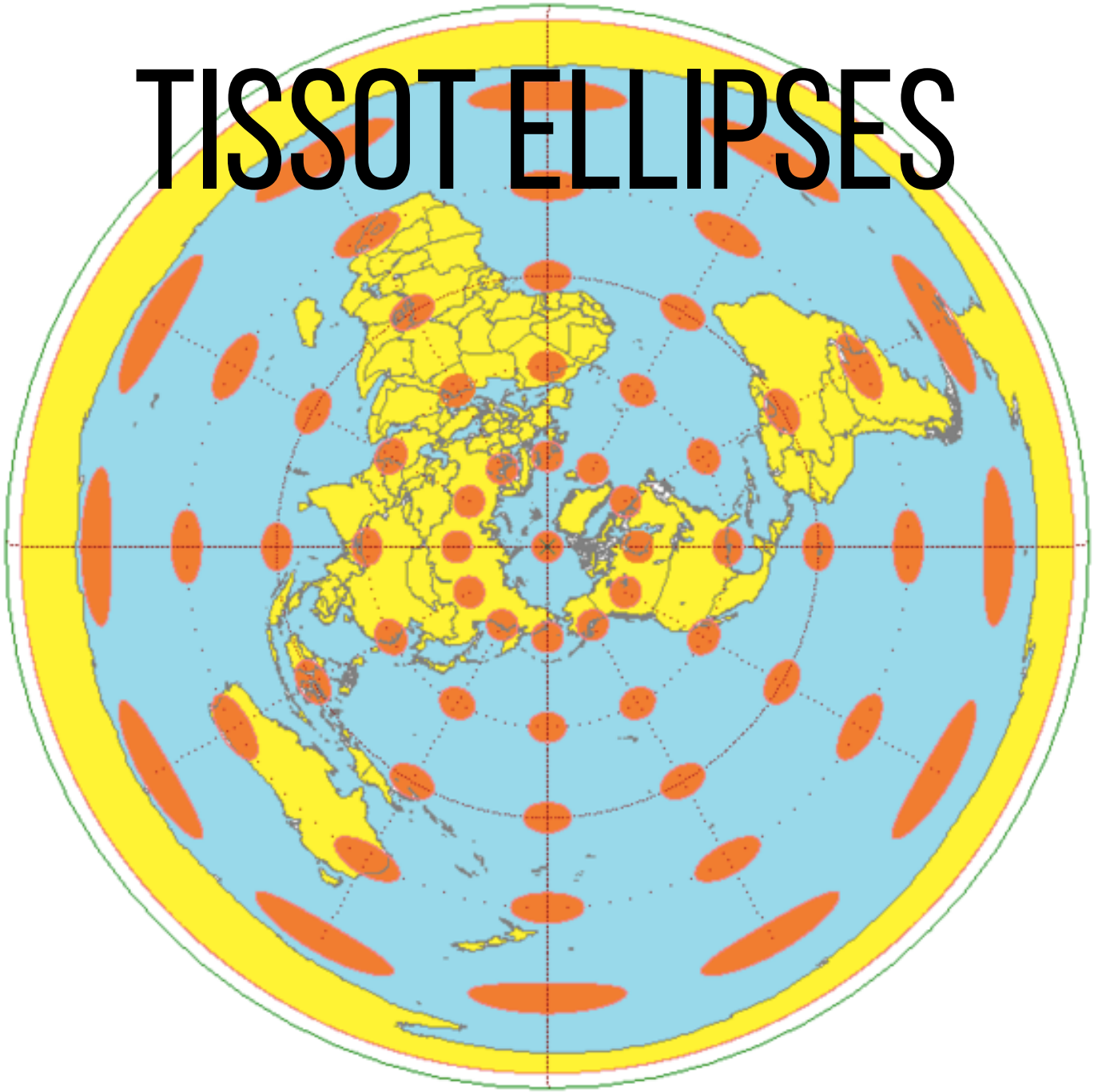
TECHNICALLY TISSOT INDICATRICES BUT...

TISSOT ELLIPSES

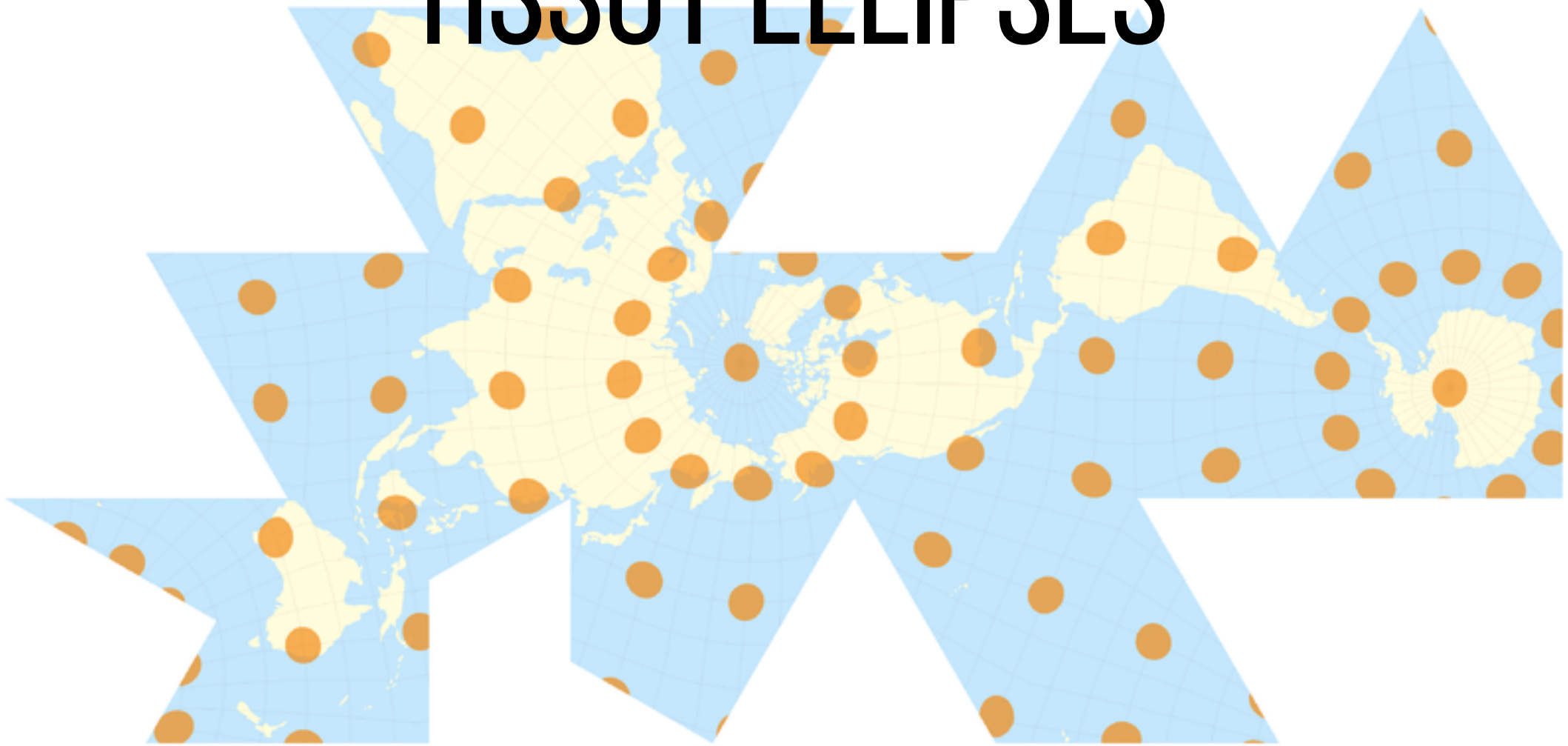
TISSOT ELLIPSES



TISSOT ELLIPSES



TISSOT ELLIPSES



WHERE IS YOUR DATA?

COORDINATE REFERENCE SYSTEM – CRS

PROJECTION + DATUM + SPHEROID.
...AND PROBABLY MORE.

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PROJCS["CGCS2000 / Gauss-Kruger CM 93E",
    GEOGCS["China Geodetic Coordinate System 2000",
        DATUM["China_2000",
            SPHEROID["CGCS2000",6378137,298.257222101,
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            AUTHORITY["EPSG","1043"]],
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            AUTHORITY["EPSG","8901"]],
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        AUTHORITY["EPSG","9001"]],
    AUTHORITY["EPSG","4505"]]
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PROJCS["WGS 84 / Pseudo-Mercator",
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        DATUM["WGS_1984",
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                AUTHORITY["EPSG","7030"]],
            AUTHORITY["EPSG","6326"]],
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            AUTHORITY["EPSG","8901"]],
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    AXIS["Y",NORTH],
    EXTENSION["PROJ4","+proj=merc +a=6378137 +b=6378137 +lat_ts=0.0 +lon_0=0.0 +x_0=0.0 +y_0=0 +k=1.0 +units=m +nadgrids=@
    AUTHORITY["EPSG","3857"]]
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EPSG: 3857

LET'S GET TO WORK.

13-classwork.zip from **#foundations**, open it up in **Jupyter**